**REMARKS**

The following amendments have been made to the application.

In response to the Examiner's objection to the drawings for failure to show the oil scoop as recited in former claims 5 and 10, the Applicant notes that although the oil scoop inadvertently left off Figure 2, its location and configuration would be apparent to one skilled in the art. See, for example, element 84 in the Matthews et al. reference cited by the Examiner. Therefore, the addition of an oil scoop to Figure 2 hereof would not constitute new matter. In any event, for convenience and without prejudice, Claims 5 and 10 have been amended here to replace recital of "oil scoop" with --oil scavenge pump in communication with an outlet--. This amendment is believed to broaden the scope of claims 5 and 10.

In response to the Examiner's objection to the abstract, a replacement abstract is enclosed not exceeding 150 words in length.

The Examiner rejected claims 1 - 4 and 6 - 9 as unpatentable under 35 USC 103(a) in view of U.S. Patent No. 6,142,729 to Tran et al. and U.S. Patent No. 5,415,478 to Matthews et al. The Examiner further rejected the same claims under 35 USC 102(b) as anticipated by U.S. Patent No. 5,941,532 to Flaherty et al. in view of U.S. 5,415,478 to Matthews et al.

As a preliminary comment, the Applicant respectfully notes that a combination of references is not permitted under 35 USC 102(b). That rejection is therefore improper. For the purposes of this response, however, the Applicant must assume the error is clerical only, and that the rejection was intended to be made under 103(a).

As a further preliminary comment, the Applicant wishes to acknowledge that the Examiner is indeed correct that hydropad seals are known in the prior art. The Applicant, however, does not claim to have invented hydropad seals, and numerous references cited in the Applicant's IDS disclose hydropad seals. The present invention is, rather, directed to a specific invention which employs hydropad seals, for the specific reasons discussed in the application. The references relied upon by the Examiner will be discussed below.

Claims 6 and 10 have been slightly amended for clarification. New claims 11-15 have been added. This amendment is supported by the disclosure at paragraphs 28 through 31, and elsewhere in the application such as paragraphs 9-13.

**Claim Rejections**

The Applicant wishes to begin by reminding the Examiner of the benefits of the present invention, as discussed particularly in Paragraph 30, and by pointing out that none of these features are disclosed or taught by the

prior art and that is simply because the prior does not disclose or teach the present invention.

Tran et al. and Flahery et al., provided to the Examiner by the Applicant, merely disclose that hydropad seals and their use in gas turbines are known. The Applicant also clearly acknowledges this fact in the Background by addressing U.S. Patent 6,257,581 (also to Flaherty et al.) The present claims, however are directed to more than just this.

Matthews et al. discloses an arrangement for use in the inter-turbine bearing compartment, i.e. one bearing compartment in a gas turbine engine.

It will be understood that (i) rotating shafts typically having bearings at two or more locations along the shaft, each bearing typically contained within its own bearing compartment, and (ii) that typical gas turbine engines have two or more rotating shafts, especially when accessory and auxiliary systems are also considered. Therefore, there is more than one bearing compartment in a gas turbine engine.

Tran et al. discloses that a hydropad seal can be used on **a** bearing cavity, however, this is not the totality of what is claimed in claims 1 or 6. The use of a hydropad seal at one seal location, as disclosed by Tran et al., or perhaps even in one bearing cavity, such as an inter-turbine bearing compartment like that disclosed by Matthews et al., is not what is claimed in the present claims. The

Examiner's attention is drawn to paragraph [0010] of the present application.

Therefore, even if Tran et al. or Flaherty et al. could be combined to teach what the Examiner alleges, the claimed invention would still not be anticipated or obviated. To obviate the claims, the references must obviate all aspects of the claimed invention, which these references do not. Respectfully, therefore, it is noted that both of the Examiner's bases for rejection (i.e. whether using wither Tran et al. or Flaherty et al.) are improper because they do not satisfy the requirements for a showing of prima facie case of obviousness, and thus the rejections should be removed. The claims, as amended, are patentable over these and all other cited references, and allowance is therefore requested.

The Applicant notes that the references cited by the Examiner also all rely on the air pressure differential across the sealing surfaces to prevent oil leakage past the seals, further indicating the difference between the references and the present invention.

U.S. Patent No. 6,142,729 to Tran et al. states (at Column 3 commencing at line 8) that "a minimal clearance is maintained such that a controlled minimum leakage of pressurised air is allowed from the air chamber 6 into the oil chamber 5 while preventing any flow back from the oil chamber 5 to the air chamber 6", and (at Column 3 commencing at line 25) states that "air pressurisation ducts are secured to the cover 24 by way of a connection

25".See also Column 3, commencing at line 38, where "the advantageous coupling between the air pressurisation and oil recovery systems". In view of the disclosure of the present invention, this discussion of an "advantageous" coupling between air and oil systems of course teaches away from the present invention.

Further, it can been seen that U.S. Patent No. 5,941,532 to Flaherty et al. also teaches reliance on the pressure differential. See Flaherty et al commencing at Column 3, line 35 Therefore, it can be seen that Flaherty et al. also teaches intermixing air and oil to maintain seal operation.

It will be understood that mixing air and oil likewise requires air-oil separation elsewhere in the oil system.

Accordingly, it is submitted that the claims are distinguished over all of the references cited by the Examiner.

Favourable consideration and allowance of the application are respectfully requested.

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1. (Currently Amended) A method of minimizing oil consumption in a gas turbine engine, by avoiding reliance on air intake into the engine oil circuit for bearing chamber oil sealing purposes, the engine having an oil circuit including:

~~at least one bearing~~a plurality of bearings supporting at least one ~~engine~~ shaft ~~at a support point~~ along ~~a~~ the shaft ~~axis~~;

~~at least one~~a bearing chamber enveloping each said bearing and maintaining a volume of oil with an oil-air interface in communication with a volume of air therein; and

oil circulation means in flow communication with each bearing chamber for supplying a flow of oil to a bearing chamber inlet and for evacuating spent oil from an outlet of the bearing chamber;

characterized in that, the method comprises:

sealing each bearing chamber with a hydropad seal disposed in sealing relation between the shaft and bearing chamber, the hydropad seal comprising an annular ring mounted to the shaft and an annular pad mounted to the chamber, the ring and pad having abutting seal surfaces;

rotating the ring during engine operation to cast oil radially outwardly from said shaft axis toward an outer periphery of the bearing chamber under centrifugal force;

collecting oil from the outer periphery of the bearing chamber and directing oil flow to the bearing chamber outlet.

2. (Original) A method according to claim 1 wherein the oil circulation operates independently of an oil-air separation function and an air venting function.

3. (Original) A method according to claim 1 wherein the abutting sealing surfaces of the hydropad remain engaged in frictional sealing relation below a lift off rotary speed.

4. (Original) A method according to claim 3 wherein the abutting sealing surfaces of the hydropad disengage when rotary speed exceeds the lift off rotary speed, the ring sealing surface casting oil outwardly under centrifugal force to impede oil passage through the hydropad seal.

5. (Currently Amended) A method according to claim 1 wherein cast oil is collected from the outer periphery of the bearing chamber using an oil ~~scoop~~ scavenge pump in communication with the bearing chamber~~disposed on said periphery~~.

6. (Currently Amended) A gas turbine engine that reduces air intake into the engine oil circuit for bearing chamber oil sealing purposes, the engine having an oil circuit including:

~~at least one bearing~~a plurality of bearings supporting at least one ~~engine~~ shaft ~~at a support point~~ along ~~a~~ the shaft ~~axis~~;

~~at least one~~a bearing chamber enveloping each said bearing and maintaining a volume of oil with an oil-air interface in communication with a volume of air therein; and

oil circulation means in flow communication with each bearing chamber for supplying a flow of oil to a bearing chamber inlet and for evacuating spent oil from an outlet of the bearing chamber;

characterized in that, the engine comprises:

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a hydropad seal disposed in sealing relation between the shaft and a bearing chamber, the hydropad seal comprising an annular ring mounted to the shaft and an annular pad mounted to the chamber, the ring and pad having abutting seal surfaces;

turbine means mounted to the shaft for rotating the ring during engine operation to cast oil radially outwardly from said shaft axis toward an outer periphery of the bearing chamber under centrifugal force; and

wherein the oil circulation means includes oil scavenge means for collecting oil from the outer periphery of the bearing chamber and directing oil flow to the bearing chamber outlet.

7. (Original) An engine according to claim 6 wherein the oil circulation means operate independently of an oil-air separation function and an air venting function.

8. (Original) An engine according to claim 6 wherein the abutting sealing surfaces of the hydropad remain engaged in frictional sealing relation below a lift off rotary speed.

9. (Original) An engine according to claim 8 wherein the abutting sealing surfaces of the hydropad disengage when rotary speed exceeds the lift off rotary speed, wherein the ring sealing surface casts oil outwardly under centrifugal force to impede oil passage through the hydropad seal.

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10. (Currently Amended) An engine according to claim 6 wherein the oil scavenge means include an oil scavenge pump in communication with ~~scoop~~ ~~disposed on the outer periphery of~~ the bearing chamber.

11. (New) A method according to claim 1 including:

retaining oil within the bearing chamber, independently of any gas pressure differential across the abutting seal surfaces of the ring and pad by rotating the ring during engine operation to cast oil radially away from the seal surfaces toward the outer periphery of the bearing chamber under said centrifugal force.

12. (New) An engine according to claim 6 wherein the turbine means are mounted to the shaft for retaining oil

within the bearing chamber, independently of any gas pressure differential across the abutting seal surfaces of the ring and pad by rotating the ring during engine operation to cast oil radially away from the seal surfaces toward the outer periphery of the bearing chamber under said centrifugal force.

13. (New) A breather-less oil system for a gas turbine engine comprising:

an oil system adapted to supply pressurized oil to and evacuate oil from a plurality of bearing chambers, the bearing chambers each having at least one oiled bearing therein supporting a rotatable component and at least one air-oil interface defined between a volume of oil within the chamber and a volume of air outside the chamber; and

a plurality of hydropad seals, wherein all of said air-oil interfaces are sealed by hydropad seals such that in use the hydropad seals permit air to enter and to exit the oil system, thereby permitting the oil system to be operated independent of an air breather apparatus.

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14. (New) A method of reducing oil consumption in a gas turbine engine having a main oil system communicating with a plurality of bearing compartments, the oil system adapted to feed oil to and remove oil from oiled bearings in the bearing chambers, each bearing chamber having an air-oil interface being defined between oil contained therein and air outside the compartment, the method comprising the step of:

reducing a net airflow into the main oil system through the air-oil interfaces by sealing each air-oil interface with a hydropad seal between the shaft and the chamber.

15. (New) A method according to claim 14 wherein the method further comprises the step of removing an air breather from the main oil system.